

Emotional Experiencing in Women With Posttraumatic Stress Disorder: Congruence Between Facial Expressivity and Self-Report¹

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The congruence between facial expressivity and self-report of emotion was examined among 11 women with sexual assault-related PTSD and 8 women without PTSD, under both a neutral and a sexual assault prime condition. The PTSD group demonstrated some incongruities in emotional responding. Although the PTSD group was as facially expressive as the control group, they reported more arousal to the emotional stimuli. Further, an inverse relationship between negative facial expressivity and self-report to negative stimuli was found for some variables for the PTSD group only, such that the less expressions they showed facially, the more negative they reported feeling. However, the overall pattern of results suggests fewer significant relationships between expression and experience than predicted.

KEY WORDS: PTSD; facial expressivity; emotion; rape.

Conceptualizations of posttraumatic stress disorder (PTSD) posit that incomplete, disrupted emotional processing of the traumatic event underlies symptomatology (e.g., Horowitz, 1986). Individuals with PTSD suffer from extreme emotional reactivity coupled with avoidance of trauma-related situations or cues, and/or an overall numbing of emotional experiencing (American Psychiatric Association [APA], 1994). Effective treatment of PTSD is theorized to result from complete accessing of the traumatic memory, including the full experience of the associated emotions, and the habituation and correc-

tive information that accompanies repeated therapeutic exposure (e.g., Foa & Rothbaum, 1998). Indeed, emotional engagement has been shown to be a critical ingredient in the successful emotional processing of traumatic experiences (Jaycox, Foa, & Morral, 1998) and emotional numbing may interfere with the success of direct therapeutic exposure (Jaycox & Foa, 1996). Despite the evident importance of disrupted emotional experience in terms of symptomatology and potential barriers to treatment of PTSD, the exact nature of these disruptions is not well understood. Such information is critical to an accurate conceptualization of the pathogenesis of PTSD, as well as to the development and refinement of treatments for PTSD.

Research and theory on emotional processes in non-clinical populations provide clues to the possible mechanisms related to emotional processing deficits in PTSD. As is widely recognized, emotions are considered to consist of three interrelated components: physiological, subjective/experiential, and behavioral/expressive (e.g., Levenson, 1994). These components are typically congruent within individuals; that is, research has found experiential and

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physiological responding to be consistent with behavioral expressivity (Gross & John, 1997; Rosenberg & Ekman, 1994). Further, studies have found that changing facial expressions of emotions results in a corresponding change in self-report and physiological responding (e.g., Buck, 1979; Notarius & Levenson, 1979).

However, research has also found naturally occurring and experimentally induced incongruities in the domains of emotional responding that may have implications for emotional processing ability. For example, it has consistently been shown that individuals who are characteristically behaviorally inexpressive (typically measured according to rates of facial expressivity of emotions) demonstrate higher physiological responding to emotional stimuli than individuals who are behaviorally expressive (e.g., Buck, 1979; Notarius & Levenson, 1979). Similar findings have been reported for studies in which subjects have been instructed to *suppress* their facial expressivity of emotions (as opposed to *change* their facial expressions as in the studies reported above; Gross & Levenson, 1993, 1997). The theories proposed to account for the change in self-report of emotional experiencing and increased physiological arousal that accompany emotional inexpressivity and suppression emphasize the physical and psychological effort required to inhibit emotions (e.g., Cacioppo et al., 1992; Notarius & Levenson, 1979).

It is the premise of this study that the emotional responding and processing deficits characteristic of PTSD may in part relate to incongruities in emotional responding, perhaps owing to attempts to suppress extreme emotional experiencing. The notion that individuals with PTSD may attempt to suppress their emotional experiencing is supported by a recent study that found combat veterans with PTSD reported making conscious attempts to withhold emotional expressions (Roemer, Orsillo, Litz, & Wagner, 2001). The avoidance criteria within the diagnostic criteria of PTSD also suggest emotional suppression (e.g., avoidance of emotions related to the traumatic experience).

The prediction of incongruities in emotional responding is based on the disparate symptomatology of PTSD as well as on leading theories on the nature of PTSD symptomatology. Theories of PTSD emphasize the functional relatedness of the extremes in emotional responding. For example, Horowitz (1986) describes an intrusion phase (of emotional experiencing) that "triggers an opponent process" of denial (numbing). Similarly, Keane, Fairbank, Caddell, Zimering, and Bender (1985) describe numbing symptoms as resulting from avoidance of emotions or evocative stimuli. The mechanisms that contribute to the functional relatedness of the extremes in PTSD symptomatology have not been fully articulated, however. On

the basis of the research on emotion presented above, emotional suppression may be one such mechanism.

That is, numbing may involve suppression of the expression of emotions (at least some components of emotional responding), which would lead to an increase in emotional experiencing (in other components). Since theories propose numbing to occur in response to trauma cues (e.g., Foa, Zinbarg, & Rothbaum, 1992; Litz, 1992), emotional suppression and incongruities in emotional experiencing would be most likely to occur subsequent to exposure to trauma cues. This pattern may therefore account for the difficulties in processing of traumatic experiences in individuals with PTSD as well as the maintenance of PTSD symptomatology.

As a preliminary examination of this theory, we examined the degree of congruency between two components of emotional experiencing, facial expressivity and self-report, in women with PTSD. We anticipated that women with PTSD would demonstrate less facial expressivity of emotion than women without PTSD, and women with PTSD would demonstrate greater discrepancies between their facial expressivity and self-report of emotions compared to women without PTSD. It was further predicted that restrictions in facial expressivity and incongruities in emotional responding among the women with PTSD would be more pronounced subsequent to a procedure that cued or primed memories of their trauma. No specific predictions were made regarding expressivity of positive versus negative emotions, as research has found decreases in emotional responding among individuals with PTSD for positive as well as negative stimuli (Litz, Orsillo, Kaloupek, & Weathers, 2000), yet viewing disruptions in emotional experiencing as related to emotion regulation efforts would suggest more pronounced effects for negative emotions.

Method

Participants

Nineteen women participated in the current study, 11 who met criteria for PTSD, and 8 nonclinical controls. Participants were recruited through flyers posted throughout the Boston area. Respondents were eligible for the PTSD group if they reported an adult sexual assault and were currently experiencing PTSD symptoms. An on-going matching procedure was used to select the control participants. Respondents were eligible for the control group if they denied any history of interpersonal violence or current PTSD symptoms associated with any other stressful life event. In order to match the two groups as closely as possible

demographically, control participants were selected so that they matched in ethnicity and did not differ in age by more than 8 years from PTSD participants.

The sample was 79% Caucasian and 21% African American, with a mean age of 33.72 ($SD = 6.97$). The majority was single (58%), and the average education obtained was 13.84 years ($SD = 0.96$). The groups did not differ significantly in racial/ethnic identity, age, marital status, or education. As would be expected, the PTSD group scored higher than the control group on a measure of PTSD, the PTSD Checklist (Blanchard, Jones-Alexander, Buckley, & Forneris, 1996), 44.49 ($SD = 11.61$) versus 19.90 ($SD = 4.29$); $t(15) = 5.64$; $p < .001$, and the Global Severity Index of the Brief Symptom Inventory (BSI; Derogatis & Spencer, 1982), 1.31 ($SD = 0.44$) versus 0.17 ($SD = 0.18$); $t(15) = 6.76$; $p < .001$, indicating higher PTSD symptomatology and greater psychological distress in the PTSD group. Relevant to the analyses reported below, groups did not differ on a self-report trait measure of emotional expressivity, the Emotional Expressivity Scale (Kring, Smith, & Neale, 1994), control group, 67.12 ($SD = 15.24$); PTSD group, 66.91 ($SD = 12.28$).

Stimuli

To elicit emotional reactions, 24 color photographic images were chosen from the *International Affective Picture System* (IAPS; Center for the Study of Emotion and Attention [CSEA-NIMH], 1999). The IAPS is a large set of photographs validated extensively by Lang and his colleagues. The individual photographs vary on two principal orthogonal dimensions of human emotion: valence (pleasantness) and arousal (degree of activation). Lang's research group has shown that participants' ratings of valence and arousal covary systematically with physiological reactions indicative of positive and negative affect states (e.g., Lang, Greenwald, Bradley, & Hamm, 1993). The final set of stimuli were selected according to normative data provided by Lang and his colleagues (Lang, Bradley, & Cuthbert, 1999) and a small scale validation study conducted by our research group and reported elsewhere (Litz et al., 2000). This consisted of 8 photos from each of the high, middle, and low tertiles on the valence scale, corresponding to pleasant (e.g., baby, puppies), neutral (e.g., basket, computer), and unpleasant (e.g., burn victim, hospital patient) slides.

Prime

The priming stimulus was an audiotape made in the following way. Participants from the PTSD group were

instructed to write about their traumatic experience for 10 min. In order to make the sexual assault prime as realistic as possible, they were provided with explicit instructions to include details of the sequence of events, as well as sensory details, such as what they were seeing, hearing, feeling, smelling, and so on. This "script" was then read in the second person (e.g., "you are walking down the street . . .") by one of the female investigators (L.R. or A. W. W.) and recorded on audiotape. A neutral tape was created in the same way by having participants (from both the PTSD and control groups) first write about a neutral event (e.g., brushing teeth). Participants listened to the audiotapes over headphones. Individuals in the control group listened to the sexual assault prime for the participant with whom they were matched on age and ethnicity. All participants listened to their own neutral script. This ideographic priming procedure is similar to that used by Pitman, Orr, Forgue, deJong, and Claiborn (1987).

Emotional Experiencing Measures

Facial expressivity of emotion was assessed by the Facial Expression Coding System (FACES; Kring & Sloan, 1992). The FACES is a behavioral observation coding system based on a dimensional model of expressivity. The FACES is based on the theory that facial expressions can best be assessed according to the two dimensions, valence and arousal (Kring et al., 1994). It yields information on the frequency, intensity, valence, and duration of expressions. A facial expression is defined by the FACES as any change in the face from a neutral expression to a non-neutral expression and then back to the neutral expression, or to a different expression (this provides the frequency count). Duration is measured by seconds, from the time the expression changes from neutral to a nonneutral expression and then back to neutral (or another expression). Valence is rated as positive or negative. Intensity ratings are scored on a 1–4 scale from low to very high. Previous research supports the validity of the FACES (e.g., Kring et al., 1994). Coding was conducted by a graduate student trained to reliability on the FACES, who was blind to the group status of the participants (reliability was defined as achieving an intraclass correlation coefficient of .8 or greater with a second trained rater, across four FACES variables (negative frequency and duration, and positive frequency and duration), on four consecutive 10 min video segments selected from therapy training tapes).

Self-report of emotional reaction to the IAPS was assessed by two 9-point rating scales. Participants were instructed to select a number from 0 to 8 that represented their current level of valence (anchored from

“unhappy/very unpleasant” to “happy/very pleasant”), and arousal (anchored from “calm” to “excited”). This rating system is analogous to the procedure used by Lang and his colleagues (e.g., Bradley & Lang, 2000).

Procedure

Respondents to the study flyers were screened by a clinician who administered the Life Events Checklist from the Clinician-Administered PTSD Scale for *DSM-IV* (CAPS-IV; Blake et al., 1998) and the PTSD Checklist (Blanchard et al., 1996). Fifteen women reported a history of sexual assault and met initial criteria for the PTSD group; of these, four later declined to participate, leaving a total of 11 women in this group. Ten women initially met criteria for the control group.

Final PTSD diagnoses were confirmed during the interview portion of the study (Day 1, described below). Interviewers were doctoral level clinicians trained in the administration of the CAPS-IV, a semistructured interview that assesses the *DSM-IV* criteria for PTSD (Blake et al., 1998). To ensure diagnostic reliability, the results of each interview were reviewed by one of two investigators (B.L. or L.R.). One participant intended to be in the control group met criteria for PTSD when interviewed and one reported marked anxiety during the interview; neither is included in this report. Comorbid diagnoses were not assessed.

Data were collected over the course of 3 days, all within 1–2 weeks of each other. Each session was approximately 2 hr in duration. On the first day, participants completed the diagnostic interview, paper and pencil questionnaires, and the narratives that became the prime scripts. Women in the PTSD group wrote about their assault, a neutral event, and a positive event they had experienced during the past 5 years (the positive script was used to address a research question in another part of the study and also to counteract negative emotions that may have arisen from the assault narrative). Women in the control group wrote about an event they assessed as “very negative” that they experienced during the past 5 years, as well as neutral and positive events. The procedures of Days 2 and 3 were similar, except on 1 day participants first listened to the sexual assault prime and on the other they listened to the neutral prime (the order of presentation was counterbalanced across participants). All participants first sat quietly for a 5 min. “baseline” period, and then listened to one of the two audiotapes. They were given the following instructions: “Please close your eyes and listen carefully to the description, imagining the event as vividly as possible, as if you were there. Continue to imagine yourself experienc-

ing the event as though you were actually there until you are instructed to stop.” Participants were next presented with the 24 slides (IAPS) via videotape (in a fixed block, randomized fashion; no slides were repeated), on a 25-in. video monitor positioned 4 feet from the participant. Each image was presented for 12 s with an intertrial interval of 30 s. Participants were videotaped during the IAPS period for Days 2 and 3 of the study, with a camera placed to the side of the video monitor. Participants were aware they were being videotaped, but they did not know facial expressivity was being assessed. Self-report of emotions was obtained on Days 2 and 3 following the “baseline” period, the audiotapes, and each IAPS image, in a paper and pencil format (they were asked “at this moment, how do you feel?” followed by the two 9-point rating scales). All eligible participants completed the entire study; there were no drop-outs from Day 1 to Day 3.

Results

Preliminary Analyses

FACES Rater Agreement

To assess reliability of facial expression coding, eight participants’ videotaped facial expressions (four from each of the two groups) were coded by a second rater, trained in the scoring of the FACES. According to the recommendations in the FACES scoring manual, intraclass correlations were computed for the pair of raters for four of the six FACES variables (negative frequency and duration; and positive frequency and duration), measured across the period of time when the IAPS slides were presented. These correlations ranged from .74 to .95, with a mean of 0.88. Among this subset of videotapes, intensity ratings were consistently low, yielding ratings across raters of only “0” (*absent*) or “1” (*low*); therefore, intraclass correlations could not be computed and instead, reliability was measured by percent agreement. Agreement was 86 and 75% for the intensity ratings of the negative and positive expressions, respectively.

FACES Variables

Six measures were obtained, reflecting overall expressivity across the IAPS period: frequency, duration, and intensity of negative expressions; and frequency, duration, and intensity of positive expressions. Correlations between these variables were high (.82–.95 with a mean of 0.91). Because of this, and to increase the overall power of

Table 1. Means and Standard Deviations for Composite Expressivity Variables

Variable	Neutral condition				Sexual assault prime condition				Group <i>F</i> (1, 17)	Condition <i>F</i> (1, 17)	Group × Condition <i>F</i> (1, 17)
	Control (<i>n</i> = 8)		PTSD (<i>n</i> = 11)		Control (<i>n</i> = 8)		PTSD (<i>n</i> = 11)				
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
Negative	−0.03	2.89	0.02	2.75	−0.47	2.81	0.34	2.82	0.13	0.02	0.61
Positive	0.09	2.84	−0.06	2.86	0.20	2.60	−0.14	3.0	0.04	0.00	0.03

the analyses, these six variables were reduced to two composite variables in the following way: *z*-transformations of the variables were computed, then the negative and positive expressivity variables were summed separately, resulting in one negative expressivity variable and one positive expressivity variable (as in Kring et al., 1994). Examination of the distributions of the composite variables indicated that they did not violate assumptions of normality.

Manipulation Check

To determine the impact of the prime condition, a 2 (group: PTSD, control) \times 2 (condition: sexual assault prime, neutral prime) MANOVA was performed, with group serving as a between-subjects factor and condition a within-subjects factor, on two dependent variables, the valence and arousal self-report scores. There was an overall effect of condition, $F(2, 15) = 92.78$, $p < .001$, and group, $F(2, 15) = 5.81$, $p < .05$, but no group by condition interaction, $F(2, 15) = 2.81$, $p = .09$. Univariate tests indicated that participants reported feeling less happy, $F(1, 16) = 197.86$, $p < .001$, and more aroused, $F(1, 16) = 5.81$, $p < .05$, subsequent to the presentation of the sexual assault prime, compared to the neutral prime, $M (SD) = 2.30 (0.81)$ versus $6.71 (1.27)$ and $4.65 (2.38)$ versus $2.79 (1.95)$, respectively. The group effect was primarily attributable to the PTSD group reporting more arousal than the control group, $F(1, 16) = 10.40$, $p < .01$; $M (SD) = 4.75 (1.81)$ versus $2.69 (2.02)$.

To ensure that the IAPS had the intended emotion eliciting effects, the average valence rating (self-report) was examined for the positive, negative, and neutral slides, under the neutral prime condition, in a 2 (group) \times 3 (slide-type, positive, negative, and neutral) ANOVA. There was an overall effect for slide-type, $F(2, 15) = 23.06$, $p < .01$, but no effect of group or group by slide-type interaction. Pairwise comparisons indicated that the positive slides were rated more positively than the neutral or negative slides, $M (SD) = 0.77 (1.06)$ and $2.66 (1.73)$, respectively, both $p < .01$, and the negative slides were rated more negatively than the neutral slides, $M (SD) = 1.89 (1.18)$, $p < .01$.

Emotional Experiencing

To examine the first hypothesis, that individuals with PTSD would show decreased facial expressivity compared to the control group, we examined the composite variables for overall negative and positive facial expressions produced during the IAPS slides, for both the neutral and sexual assault prime conditions (Table 1). Two separate 2 (group) \times 2 (condition) ANOVAs were computed, with group a between-subjects factor and condition a within-subjects factor, examining the negative and positive expressivity variables separately. For both analyses, the omnibus *F* ratios were nonsignificant for the group, condition, and the Group \times Condition interaction effects, indicating that the groups did not differ on expressivity under either condition. Because of limited power, however, these nonsignificant findings should be interpreted with caution. Nonetheless, the effect sizes were also low (range .00–.04), suggesting that nonsignificant findings would likely remain if power was increased.

Prior to testing the second hypothesis, that the PTSD group would demonstrate discordant emotional responses, self-report of emotions during the IAPS was first examined. Two separate 2 (group) \times 2 (condition) MANOVAs were computed, with group a between-subjects factor and condition a within-subjects factor, examining the two self-report scale scores (valence and arousal) for the positive and negative slides separately (since we were interested in examining degree of congruence in response to emotional stimuli, self-report scores to the neutral slides were not analyzed). For the analysis of self-report scores with the positive slides, there was an overall effect of group, $F(2, 15) = 5.15$, $p < .05$, $\eta^2 = .41$, but no condition effect, $F(2, 15) = 2.36$, $p = .13$, $\eta^2 = .24$, nor group by condition interaction, $F(2, 15) = 1.55$, $p = .24$; $\eta^2 = .17$. The group effect was primarily attributable to the PTSD group reporting more arousal than the control group, $F(1, 16) = 8.85$, $p < .01$, $\eta^2 = .36$. For the analysis of self-report scores with the negative slides, there was also an overall group effect, $F(2, 15) = 7.47$, $p < .01$, $\eta^2 = .50$, but no condition effect $F(2, 15) = 1.55$, $p = .24$, $\eta^2 = .17$, nor was there a group by condition interaction, $F(2, 15) = .27$, $p = .77$, $\eta^2 = .03$. The group

Table 2. Self-Report of Valence and Arousal During Presentation of Positive and Negative Slides

	Neutral condition				Sexual assault prime condition			
	Control (<i>n</i> = 8)		PTSD (<i>n</i> = 11)		Control (<i>n</i> = 8)		PTSD (<i>n</i> = 11)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Positive slides								
Valence	6.50	0.92	6.22	1.06	5.73	1.09	5.94	1.09
Arousal ^a	2.98	1.61	4.61	1.32	3.55	1.81	5.52	1.20
Negative slides								
Valence	4.34	1.54	3.06	1.10	3.78	1.37	2.82	0.98
Arousal ^a	2.75	0.85	5.01	1.70	3.25	1.39	5.32	1.83

^aOverall group effect significant at $p < .01$.

effect was primarily attributable to the PTSD group reporting higher arousal, $F(1, 16) = 12.44$, $p < .01$, $\eta^2 = .44$, than the control group. Table 2 contains the means and standards deviations for the self-report scale scores.

Degree of congruence between facial expressivity and self-report of emotional experience was then examined by computing correlations between the expression variables and the self-report scores, for both neutral and sexual assault prime conditions. Expression variables were measured across all IAPS slides and self-report ratings were computed for the positive and negative slides separately. Again, composite positive and negative expression variables were used for these analyses.

Table 3 reports the correlations between the expressivity and experiencing variables according to valence category of the IAPS and condition, as well as the z transformations of r (Cohen, 1988; Cohen & Cohen, 1983). Table 4 contains significance tests of the differences between the two groups for the z transformed coefficients,

based on computation of the normal curve deviate (appropriate for coefficients obtained from two different random samples; Cohen & Cohen, 1983). In Table 3 it can be seen that, subsequent to the neutral prime, an association existed between the expression and experiencing of negative emotions for the control group (such that the more negative they reported feeling, the more negative expressions they displayed), however, there was no statistical association between expression and experiencing of arousal or valence for the PTSD group. The group differences were statistically significant for the associations between expressivity and self-report of valence. In the sexual assault prime condition the control group continued to demonstrate similar degrees of consistency between expression and experiencing of valence. However, the correlations between expression and experiencing for the PTSD group suggest some incongruities in these domains; that is, less negative facial expressivity was associated with reports of greater arousal. For the PTSD group, in the sexual assault prime condition, there was no statistical association between expressivity and self-report of valence. There was a trend for statistically significant group differences for the correlations between expression and self-report of valence.

For the control group, no statistical association was evident between positive expressivity and self-reports of valence or arousal to the positive IAPS slides for either

Table 3. Correlations Between Expressivity Composite Variables and Self-Report of Valence and Arousal According to Condition and Valence of Slides

Condition	Expressivity			
	Control (<i>n</i> = 8)		PTSD (<i>n</i> = 11)	
	<i>r</i>	<i>z</i>	<i>r</i>	<i>z</i>
Negative slides				
Neutral prime				
Valence	-.81**	-1.13	.13	0.13
Arousal	-.41	-0.44	.09	0.09
Assault prime				
Valence	-.68**	-0.83	.21	0.21
Arousal	-.26	-0.27	-.61**	-0.71
Positive slides				
Neutral prime				
Valence	.02	0.02	.56*	0.63
Arousal	-.16	-0.16	.29	0.30
Assault prime				
Valence	.23	0.23	.29	0.30
Arousal	-.27	-0.27	.38	0.40

* $p < .10$. ** $p < .05$.

Table 4. Significance Tests of Group Comparisons of Correlations Between Expressivity and Experiencing Variables, Based on z Transformations of r

	Negative emotionality	Effect size	Positive emotionality	Effect size
Neutral prime				
Valence	-2.15**	.94	-1.05	.54
Arousal	-0.90	.50	-0.79	.45
Assault prime				
Valence	-1.78*	.89	-0.11	.06
Arousal	0.76	.35	-1.16	.65

* $p < .10$. ** $p < .05$.

condition. For the PTSD group, there was a trend for an association between positive expressivity and self-reports of valence to the positive slides under the neutral condition (the more positive expressions they exhibited, the more positive they reported feeling). In contrast, subsequent to the sexual assault prime, no statistical association was evident between positive expressivity and either of the self-report ratings to the positive slides, and there were no statistically significant group differences in the magnitude or direction of the correlations. Nonetheless, as can be seen, the effect sizes were moderate to large for the majority of group comparisons.

Discussion

The results of this study lend some support to the hypothesis that individuals with PTSD demonstrate incongruity in domains of emotional experiencing, although the pattern of findings was not as consistent as expected. Although the PTSD group did not differ from the control group in overall facial expressivity they showed in reaction to emotionally evocative slides, they did differ in self-report of emotional reactions to the slides. In response to both the negative and positive slides, the PTSD group reported feeling more aroused than the control group. Thus, although the two groups did not differ on how emotional they appeared, the PTSD group differed in their report of overall emotional arousal. This suggests a degree of disconnection between facial expressivity and self-report, although it should be noted that the groups did not differ significantly on their self-reports of valence.

Some degree of incongruity in emotional experiencing among the PTSD group was also evident when correlations were examined between self-report during the slides and overall negative expressivity. Under the neutral condition, the PTSD group evidenced no association between self-report of emotion to the negative slides and overall negative expressiveness, and under the sexual assault prime, they showed discrepancies, such that the less overall negative expressivity they showed facially, the more aroused they reported feeling. In contrast, the control group showed some degree of congruence under both conditions (the more negative expressions they showed overall, the more negative they reported feeling during the negative slides).

Overall, however, the pattern of results indicated fewer group differences in degree of congruence between domains than predicted. The correlations between domains of experiencing in reaction to the positive slides generally indicated no congruency between experience

and overall positive expressivity for either group. These findings are difficult to interpret, but may reflect restrictions and limitations of the expressivity variable. The overall magnitude of the positive expressivity variable was quite low, with high variability, for both groups. This could in turn be due to a failure of the slides to consistently elicit gross facial expressions. In addition, the expressivity variable was measured across the entire slide observation period and could not be analyzed according to slide valence, which may have further restricted the overall magnitude of the variable. This may also explain the relatively few significant findings for the correlations for the domains of experiencing in reaction to the negative slides.

Given the small sample size and the fact that the results were not as strong as expected, any interpretations of these data should be made cautiously. Nonetheless, some of the results for negative emotional experiencing are consistent with research and theory on emotional responding and may point to future directions for research aimed at understanding the development and/or maintenance of emotional experiencing deficits among individuals with PTSD. For example, it has been suggested that inhibition or suppression of responding in one domain (such as facial expressivity) can lead to an increase in responding in another domain (such as self-report of internal experiencing; cf. Cacioppo et al., 1992). It may be the case that individuals with PTSD attempt to suppress their facial expressivity (e.g., for social reasons or emotion regulation), which leads to an increase in internal experiencing. This idea is compatible with theories on the hypo and hyper-emotionality characteristic of PTSD (Horowitz, 1986; Litz, 1992).

Whether or not individuals with PTSD consciously or strategically attempt to regulate their facial expressivity, incongruity in the domains of emotional experiencing may contribute to the maintenance of PTSD-related problems. For example, research indicates that effective processing of traumatic experiences necessitates emotional engagement and habituation (Jaycox et al., 1998). If facial expressivity and internal experiencing are linked in the way described above, decreased facial expressivity may interfere with emotional experiencing, therefore slowing or preventing habituation. Further, in treatment settings, discrepancies between expression and experience may render it difficult for therapists to accurately gauge the impact of therapeutic interventions, such as exposure.

It is noteworthy that the effect of the prime condition was not as strong as expected for the PTSD group. Subsequent to the procedure that primed the subjects to memories of their traumas, both the PTSD and control groups reported increases in self-reports of distress, but

the PTSD group was not differentially effected. Similarly, there was no differential effect of the prime on facial expressivity for the PTSD group. It could be the case that the control group had a strong empathic reaction to the prime condition due to the method in which priming occurred which had a significant effect on their emotional responding. Nonetheless, an effect of priming on the PTSD group was evident when congruence between facial expressivity and self-report was examined, supporting the notion that *some aspects* of emotional experiencing among individuals with PTSD are more likely to be disrupted under conditions in which memories of trauma are activated (Litz, 1992).

In addition to the small sample size, limitations of this study should be noted. This sample consisted of adult women with sexual assault-related PTSD, thus the applicability of these findings to other populations (such as men, children, or women with other traumatic experiences) is unknown. Future studies using larger and more heterogeneous samples are clearly needed. Further, comorbid psychiatric diagnoses were not assessed, and the control group was predominantly a healthy, nonclinical sample—thus, it cannot be determined whether the findings are attributable to PTSD specifically, or to other aspects of this sample, such as anxiety. Another potential confound relates to the priming procedure—scripts were based on an actual event experienced by the PTSD group, while the control group simply listened to scripts from matched individuals in the PTSD group. Nonetheless, the goal was to develop a procedure that would be as emotionally evocative as possible for the PTSD group while minimizing variability across the control group, and the procedure used here achieved these goals. An additional limitation of this study is that facial expressivity was assessed over the entire emotion-eliciting task and could not be coded according to the category of slide shown (positive, negative, neutral); thus the correlations between expression and experience reported do not reflect temporal congruence, but instead, an approximation of congruence. Finally, this study measured two domains of emotional responding only (expressive and self-report). The degree of congruence within the entire emotional response system, including physiological responding was not assessed.

Nonetheless, the data reported here suggest that the emotional experiencing deficits in PTSD may be partly related to incongruity in the domains of affective experience. Future investigations into the factors related to the development and maintenance of emotional disruptions in PTSD may therefore benefit from examining the relations between domains of responding, rather than simply the presence or absence of affective responses.

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